

PATENT

Specification

A proper identification of the trademark THERMOCARB has been inserted into the application which Applicants believe clarifies the nature of this product and how it is used for purposes of describing the present invention. Thus at the first occurrence of the trademark, Applicants have inserted the aforementioned explanation.

Claim Rejections 35 U.S.C. § 112

Claim 9 has been rejected by the Examiner under this section as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Examiner was concerned that the claim required only one nickel-coated graphite fiber. Applicants have amended the claim to specify that fibers are meant to be included and hence this rejection should be overcome. The changes to the other claims relate to the correction of grammar and syntax.

Claims Rejections – 35 U.S.C. § 102

The Examiner has cited Braun et al U.S. Patent No. 6,180,275 against claims 9-11, 16-17, 20, 36 and 40 under section 102(e), rejecting the claims as being anticipated by the reference.

Applicants are enclosing Declarations under 37 C.F.R. 1.131 sworn by each of the inventors, Dr. Mukesh Bisaria and Dr. Yuqi Cai which clearly establish that the subject matter claimed in the present application was completed in Canada before the filing date of the cited patent, which is the applicable date for 102(e) purposes. The filing date of the cited patent is November 18, 1998, and the Declaration establishes that the invention was completed before this date. In particular, Lab Notebook Pages have been included which show that experimental work was conducted in September, October and November, 1998 which falls within the scope of the claims to which the Examiner has made the rejection. Applicants would submit that this evidence clearly shows that the claimed invention was reduced to practical form before the earliest date of record on the Braun reference. Thus the rejection should be withdrawn.



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Claims Rejections - 35 U.S.C. § 103

The Examiner has rejected claims 1-8, 12-15 and 18-19 under this section as being unpatentable over Braun, cited above, in view of Wakui et al, U.S. Patent No. 4,851,497 and Luxon et al, U.S. Patent No. 4,818,615.

In Applicants' view, this rejection fails because the Braun reference does not constitute prior art citable under this section of the Patent Act. Applicants have submitted Declarations by two of the named inventors establishing that the invention of this application was made before the earliest date of record on the Braun patent and on that basis, the reference cannot be applied against the claims. In this circumstance, the basis for the Examiner's 103 rejection is improper and hence the rejection should be withdrawn.

Under the circumstances, Applicants believe that the claims as submitted are in allowable form and requests that the Examiner issue a Notice of Allowance.

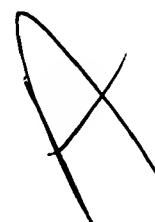
Favourable reconsideration of this application and response is respectfully requested.

Respectfully submitted,



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Date: October 1, 2001
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3. The process of Claim 1, wherein the nickel-coated graphite fibers are of a diameter in the range of about 5[-] to about 15 micrometers.

4. The process of Claim 1, wherein the nickel-coated graphite fibers have a nickel-coating representing about 45%[-] to about 60% or a total weight of the nickel-coated graphite fibers.

8. The process of Claim 1, wherein the binder resin comprises about 5%[-] to about 15% by weight of the graphite.

9. A shaped article having a volume resistivity of less than 10^2 ohm-cm comprising about 50[-] to about 95% by weight of [an]a thermoplastic aromatic liquid crystalline polymer and about 5% to about 50% by weight of [a] nickel-coated graphite [fiber]fibers of a length less than 2 cm, and a non-liquid-crystalline thermoplastic resin[.] at a concentration of about 0.1%[-] to about 20% by weight with respect to the weight of the graphite.

16. The shaped article of Claim 9, wherein the binder resin comprises about 5%[-] to about 15% by weight of the graphite.

impregnation, in-situ polymerization of dispersed monomer, and electrodeposition. No one means, however, known in the art, is preferred over another.

Aromatic thermoplastic liquid crystalline polymers are manufactured and commercially available as pellets ca. 0.125" in diameter. It is found surprisingly in the practice of the present invention that conductivity is improved when aromatic liquid crystalline pellets are subject to size attrition to form particles having a mean particle size of less than 1500 μm , preferably less than 1000 μm , prior to combining with a conductive graphite filler.

In a further embodiment of the present invention, an aromatic thermoplastic liquid crystalline resin having a mean particle size of less than 1500 μm , preferably less than 1000 μm , is combined with a conductive graphite filler. In the process of the present invention, the aromatic thermoplastic liquid crystalline resin is preferably dry mixed, as by tumbling, with the graphite filler to form a coarse homogeneous mixture. The mixture is fed to the feed throat of an injection molding machine and the aromatic thermoplastic liquid crystalline polymer melts as it is conveyed along the screw flights, and the action of the screw causes the filler to disperse within the aromatic thermoplastic liquid crystalline resin melt. The molten dispersion is fed to a mold in which the melt hardens to form a shaped article which is then ejected from the mold.

The conductive graphite filler is present in the composition of the invention at concentrations in the range of about 5% to 80%, preferably about 30% to 70% by weight, most preferably 30% to 50% by weight. Suitable graphite fillers include powdered graphite, such as Thermocarb® graphite powder* from Conoco, Inc., more preferably a graphite fiber, such as pitch based graphite fibers available from Conoco, Inc., still more preferably, a metal-coated graphite fiber, most preferably a nickel-coated graphite fiber such as hereinabove described.

Attrition of the particle size of the aromatic thermoplastic liquid crystalline resin pellets may be accomplished according to the following procedure: A rotary cutter or grinder, such as an ABBE cutter (Model Number: 000 Laboratory Rotary Cutter serial no. 49491, Abbe Engineering Company, Brooklyn, NY 11211), is equipped with a metal screen having holes 0.060 inches (0.15 cm) in diameter. A beaker is filled with aromatic thermoplastic liquid crystalline resin pellets and immersed in liquid nitrogen and held for ca. two minutes after the liquid has stopped boiling. After immersion in the liquid nitrogen, the beaker of pellets is removed and the pellets fed to the moving blades of the cutter. Frequent clearing of the cutter is necessary because only ca. 50% of the resin pellets are actually effectively cut, leaving the cutter

* (It should be noted that all references to Thermocarb®, Thermocarb and any other spellings thereof are meant to refer to the commercial product known as THERMOCARB, a trademark which identifies graphite powder sold by Conoco.)